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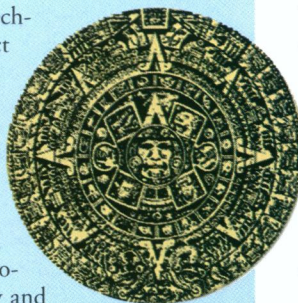
The summer solstice is a time when people's attention focuses on the sun. A World Wide Web site with the same name shares that focus. Created by the Center for Renewable Energy and Sustainable Technology (CREST), the Solstice site (<http://solstice.crest.org>) offers a fairly comprehensive intro-

duction to the topics of renewable energy, energy efficiency, the environment, and sustainable development.

One of CREST's primary functions is to explore and demonstrate the use of advanced information and communication technologies. Solstice provides information arranged by subject and type in the categories of energy efficiency, the environment, renewables and alternatives; legislation, policy, and economics; education and social issues, planning, and computers and networking in the context of alternative energy resources.

Solstice also provides two interactive energy education modules that use text and images to teach the theoretical and practical basis of passive solar and renewable energy at an introductory level. The passive solar module provides an overview and information on design, benefits, and resources. Technology areas covered by the renewable energy module are labeled solar, wind power, small hydro, geothermal, and biomass. This module provides a basic overview of the history and theory of each technology, case studies and applications, and economics and global impact. Internet addresses are available for users to direct questions or comments about the modules to experts at Solstice. The Solstice site also offers hyperlinks to related sites including the U.S. Department of Energy's Energy Efficiency and Renewable Energy Network.

Once you have soaked up enough information about renewable resources, it might be time to soak up some sun (with sunscreen, of course). One way to do this is by throwing a frisbee. Users who would like to join pick-up games of ultimate frisbee should take a glance at The Frisbee Page (<http://www.sccs.swarthmore.edu/~dalewis/frisbee.html>). Everything you ever wanted to know about frisbee is in there and if you don't own a frisbee yet, you can order one through the Internet Disc Shoppe. Pick-up games are listed by state.



Collecting plants, insects, and other natural materials for research or for retail can threaten endangered species, speakers warned. It's a myth that harvesting non-timber products, such as nuts, doesn't harm the ecosystems of rainforests, where many medicinal plants grow, warned Charles Peters, curator of botany at the Institute of Economic Botany of the New York Botanical Garden in Bronx, New York. Local people may reap the benefits of a forest for centuries without causing problems, but increasing that harvest even slightly can prove disruptive, Peters said. For one, although there are many different species in the rainforest, no one species is very abundant. Also, tropical plants have difficulty establishing seedlings. Moreover, species are dependent on one another for survival.

People in the countries where valuable medicinal plants or other species exist, including the indigenous people knowledgeable about the plants, need protecting as well, speakers pointed out. The traditional healers of the world, experts on the medicinal power of plants, are dying off and no one is taking their places, conference speakers warned. One indigenous culture goes extinct every year in the Amazon alone, according to Katy Moran, executive director of the Healing Forest Conservancy in Washington, DC.

Current law fails to ensure that indigenous people receive any benefits when companies develop products that use the fruits of their forests, Mays said. At the same time, countries need incentives to preserve and to provide access to their plants for possible drug discovery. To address these problems, NCI has developed legal agreements that guarantee that countries receive financial rewards and scientific assistance for their contributions to new drugs.

Throughout the meeting, speakers emphasized the importance of taking a holistic approach to preserving biodiversity: saving not just the individual species, but entire ecosystems and cultures. Speakers also warned that medical, scientific, and environmental organizations working on biodiversity issues must strengthen and better coordinate their efforts, particularly in light of new congressional efforts to lift protections for endangered species.

Russian Rivers of Radiation

From 1949 until 1956, workers at the Soviet Union's first nuclear weapons facility in the southern Ural mountains dumped nearly 80 million cubic meters of liquid radioactive waste into the Techa River, a regional waterway shared by 30 villages that dot its shores. Unaware that the river

going extinct at an increasingly rapid pace, which threatens this supply of healing ingredients, researchers warned at the conference, sponsored by the National Institutes of Health, the National Science Foundation, the Smithsonian Institution, the National Association of Physicians for the Environment, and the Pan American Health Organization.

For the past 40 years, the National Cancer Institute has screened plants for their chemotherapeutic activity, said Thomas D. Mays of NCI's Office of Technology Development. Contractors working for NCI have collected 35,000 plant samples, representing 9,000 to 10,000 species, from Africa and Madagascar, Central and South America, and Southeast Asia. NCI now also looks for plant-based compounds that thwart the AIDS virus, Mays said. The institute is supporting preclinical investigations of three possible anti-HIV agents derived from plants. One, michellamine B, comes from a woody vine called a liana, found in Cameroon. Liana extracts may work against malaria as well, Mays added. Another possible anti-HIV agent is

conocurvone, from the Australian smoke-weed bush. Two related compounds from a Malaysian rainforest tree, calanolide A and costatolide, may also thwart HIV.

Researchers are also investigating the antiviral potential of prostratin, a molecule in the bark of a Samoan tree, said Paul Alan Cox, a professor of botany at Brigham Young University in Provo, Utah. Samoan healers use prostratin for treating patients with yellow fever. It appears to interfere with viral replication and protect cells from HIV, Cox said. Recently, Cox and his colleagues learned of a compound in the bark of the Samoan tree that appears to stimulate the immune system and double the life span of certain immune cells.

The unique behavior of certain animals may also offer clues for how to prevent or treat diseases, said Eric Chivian of Physicians for Social Responsibility in Washington, DC. For example, understanding why black bears, an endangered species in many parts of the world, can hibernate without losing bone mass may help scientists find ways to prevent bone loss suffered by the elderly, bedridden patients, and astronauts.

had been contaminated by plutonium, the 64,000 villagers drank its water, washed their clothes in it, and bathed in it for decades. Among other nuclear accidents at the plant, 217 villages of 272,000 inhabitants were also exposed to 2 million curies of radiation released when a liquid-waste storage tank blew up in 1957. Unlike any other region in the world, at least 400,000 people have been continuously exposed to both external radiation, the gamma rays deposited throughout the area, and internal radiation, the strontium-90 and cesium-137 absorbed from drinking water and contaminated vegetables, according to a February article in *Science*.

Soviet scientists carefully studied the villagers for three decades. Soviet secrecy, however, prevented any results from becoming public; even the villagers were never told why they were being examined. But in early January, a team of radiation biologists from the United States, Europe, and Japan traveled to the city of Chelyabinsk, home of the long-secret nuclear facility Chelyabinsk-65 and its Mayak plutonium production plant, to meet their Russian counterparts and take a look at the research for the first time. Such data represent the only known studies in the world on long-term, low-dose radiation exposure; studies in Hiroshima and Nagasaki, in contrast, were based on short-term, high-dose exposure.

"The Russian scientists have carried out some unique studies, including the only reliable research on the long-term effects of plutonium exposure," writes Michael Balter in his article in *Science*. One epidemiological study of 28,000 Techa River villagers "found a statistically significant increase in leukemia incidence, as well as an overall increase in cancer mortality, compared to control populations that did

not live in the contaminated zone. Still, the leukemia risk per unit of radiation dose was at least two times smaller than that of the atomic bomb survivors," he says.

Over the years, several local physicians had tried to gain access to the data being collected on their patients by the Institute of Biophysics Branch Number Four. According to Diahanna Lynch, coordinator of the Russian Environment and Energy Project at the Natural Resources Defense Council, Russian doctor Gulfarida Galimova threatened to prevent the institute's researchers from continuing to examine her patients if they did not provide more information on their condition. In 1993, the researchers gave her a list of 285 patients diagnosed with chronic radiation sickness in her village of Muslyumova, 50 miles downstream on the Techa River from Chelyabinsk-65.

"In 1993, Dr. Galimova determined that of the more than 4,000 residents in the village, about 3,000 were examined by the institute," says Lynch. "Of these, she says, 92% had some kind of chronic illness, ranging from circulatory problems to birth defects such as missing kidneys. Dr. Galimova has also been a local activist in the Chelyabinsk Movement for Nuclear Safety, encouraging people to lobby the government to resettle the village in a cleaner area, and to demand compensation for the damage to the villagers," said Lynch.

Traces of plutonium have been found in the organs and tissues of the villagers and local animals, according to a recent article in *Surviving Together*, published by the environmental organization ISAR (formerly the Institute for Soviet-American Relations), in Washington, DC. In addition, an article distributed by the Japanese Kyodo News Service after the January

1995 meeting in Chelyabinsk reported that villagers along the Techa River have more lymphatic genetic mutations than people who suffered radiation from the atomic bombing of Hiroshima. Scientists also discovered a buildup of strontium-90 and other radioactive isotopes in the livers and in other organs of the local residents, as well as an increasing incidence of mutations of the gene responsible for T-cell antigen receptors in lymphocytes in peripheral blood, according to the article.

In January, President Boris Yeltsin's former environment adviser, Alexei Yablokov, now in charge of environmental matters for the country's top policy-making body, the Security Council, warned that radiation from the Chelyabinsk site could ultimately spread to the North Pole. He said that radioactive groundwater was now contaminating the Tobol River, which feeds into the Ob River system. The Ob system empties into the Barents Sea, which flows toward the North Pole. He also said that total radiation around Chelyabinsk-65 is 22 times the radiation released in the 1986 explosion at the Chernobyl nuclear reactor in Ukraine. Although the Mayak facility's five industrial uranium-graphite reactors have been shut down, the plant is still used for reprocessing spent fuel.

As the Cell Cycles

Scientists have known for decades that exposure to certain environmental agents can lead to cancer, and many have suspected that this occurs through the alteration of cell cycle controls. Until recently, however, not enough was known about the molecular basis of cell growth and division to understand the specific pathways by which such agents could alter cell growth in a way that leads to cancer. In the last few years, a large number of specific control points in the cell cycle have been identified, as have the individual genes and proteins that regulate these checkpoints. Researchers have observed that alteration of such controls can disrupt normal cell cycle regulation, but the mechanisms by which chemical treatment or exposure affects these critical functions are largely unknown. Recent research in this area, however, has shed some light on how environmental agents and external cell signals affect cell cycle regulation.

All eukaryotes, from yeast to humans, share many features in the process of cell division. Cells that are actively growing and dividing pass through four stages: G_1 (gap), followed by the S-phase in which the chromosomal DNA replicates, G_2 , and finally M (mitosis), in which the chromosomes move to opposite ends of the cell



Paula Garb

Downriver risk. A family in Muslyumovo grows vegetables on the banks of the contaminated Techa river, 50 miles from Chelyabinsk-65.